Hole's Human Anatomy and Physiology

Twelfth Edition

Shier ◆ Butler ◆ Lewis

Chapter 8
Joints of the Skeletal System

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8.1: Introduction

- Are known as articulations
- Functional junctions between bones
- Bind parts of skeletal system together
- Make bone growth possible
- Permit parts of the skeleton to change shape during childbirth
- Enable body to move in response to skeletal muscle contraction
- Three (3) classifications of joints will be considered

8.2: Classification of Joints

- (1) Fibrous joints
  - Dense connective tissues connect bones
  - Between bones in close contact
- (2) Cartilaginous joints
  - Hyaline cartilage or fibrocartilage connect bones
- (3) Synovial joints
  - Most complex
  - Allow free movement

- These joints are also known as:
- Synarthrotic joints
  - Considered immovable
- Amphiarthrotic joints
  - Slightly movable
- Diarthrotic joints
  - Freely movable

Fibrous Joints

- There are three (3) types of fibrous joints (synarthroses):
  - Syndesmosis
  - Suture
  - Gomphosis

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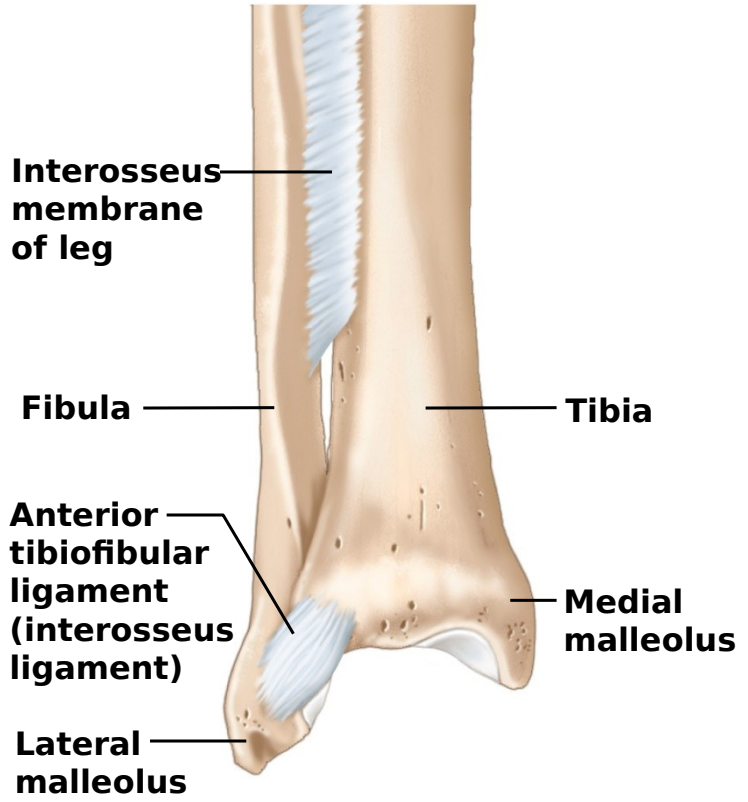

- Syndesmosis:
  - A sheet or bundle of fibrous tissue connecting bones
  - Lies between tibia and fibula (interosseous membrane)

Fibrous Joints

- Suture:
  - Between flat bones
  - See teeth-like projections
  - Thin layer of connective tissue connects bones
  - Skull

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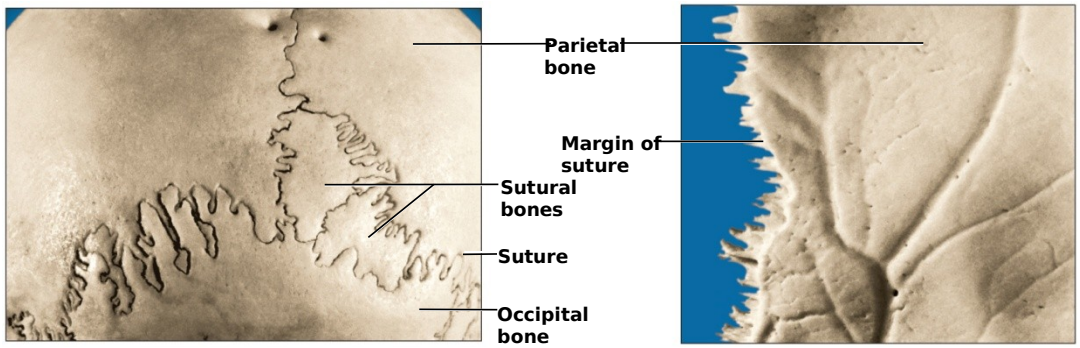

Courtesy of John W. Hole, Jr.

- Gomphosis:
  - Cone-shaped bony process in a socket
  - Tooth in jawbone

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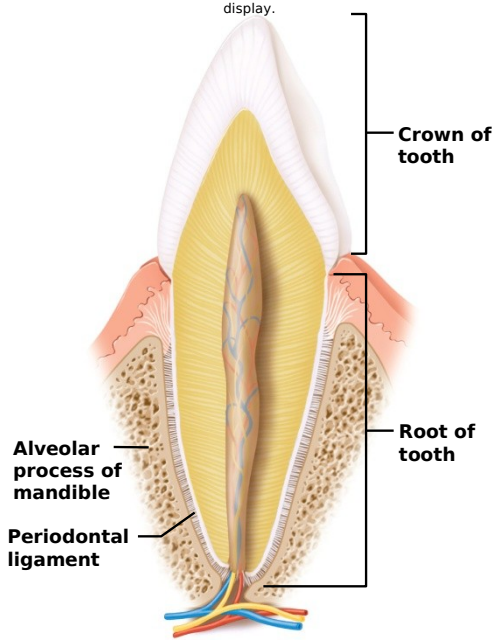

Cartilaginous Joints

here are two (2) types of cartilaginous joints (amphiarthroses):

- Synchondrosis
- Symphysis

- Synchondrosis:
  - Bands of hyaline cartilage unite bones
  - Epiphyseal plate (temporary)
  - Between manubrium and the first rib (costal cartilages)

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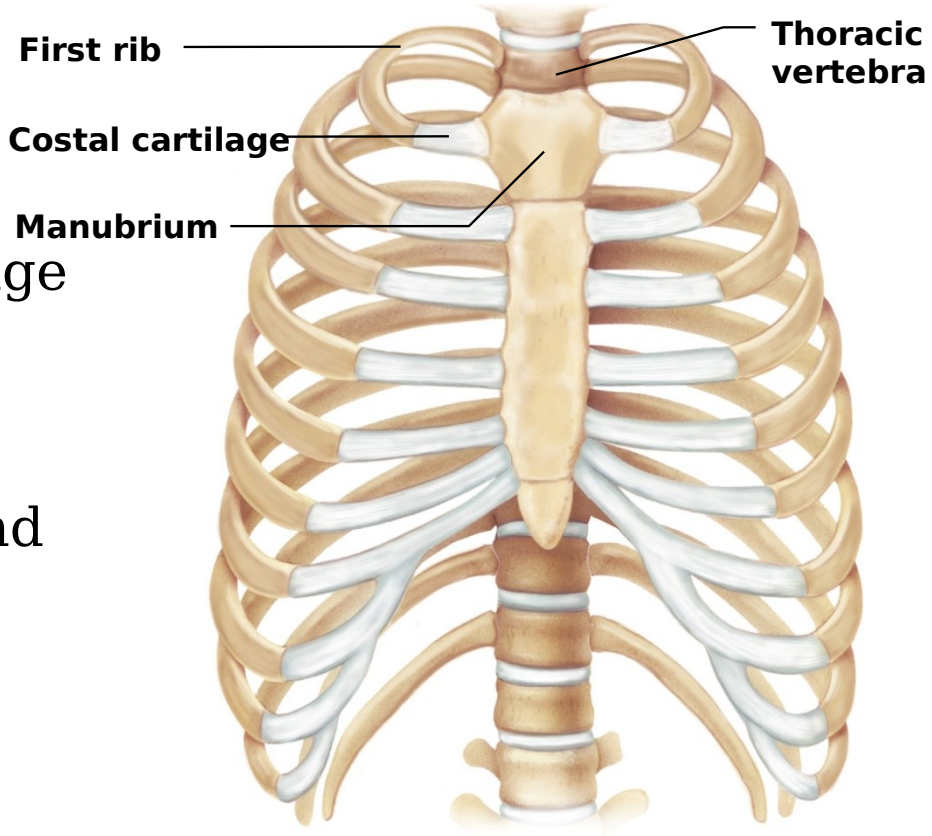

Cartilaginous Joints

- Symphysis:
  - Pad of fibrocartilage between bones
  - Pubic symphysis
  - Joint between bodies of adjacent vertebrae

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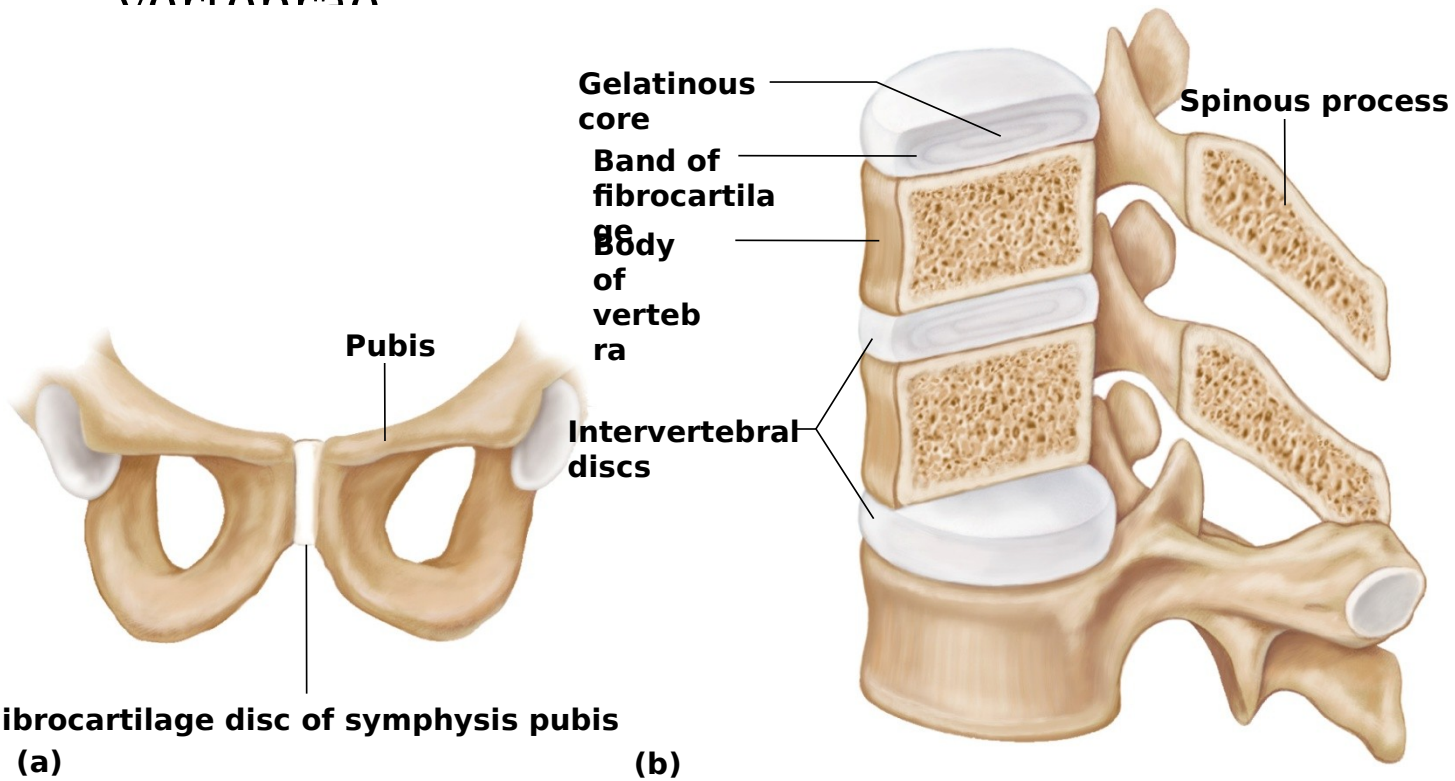

8.3: General Structure of a Synovial Joint

- Synovial joints are freely moveable (diarthroses)
- There are three (3) types of diarthroses
- There are specific parts of a diarthroses:
  - Articular cartilage
  - Joint cavity
  - Joint capsule
  - Synovial membrane
  - Synovial fluid
  - Meniscus
  - Bursae

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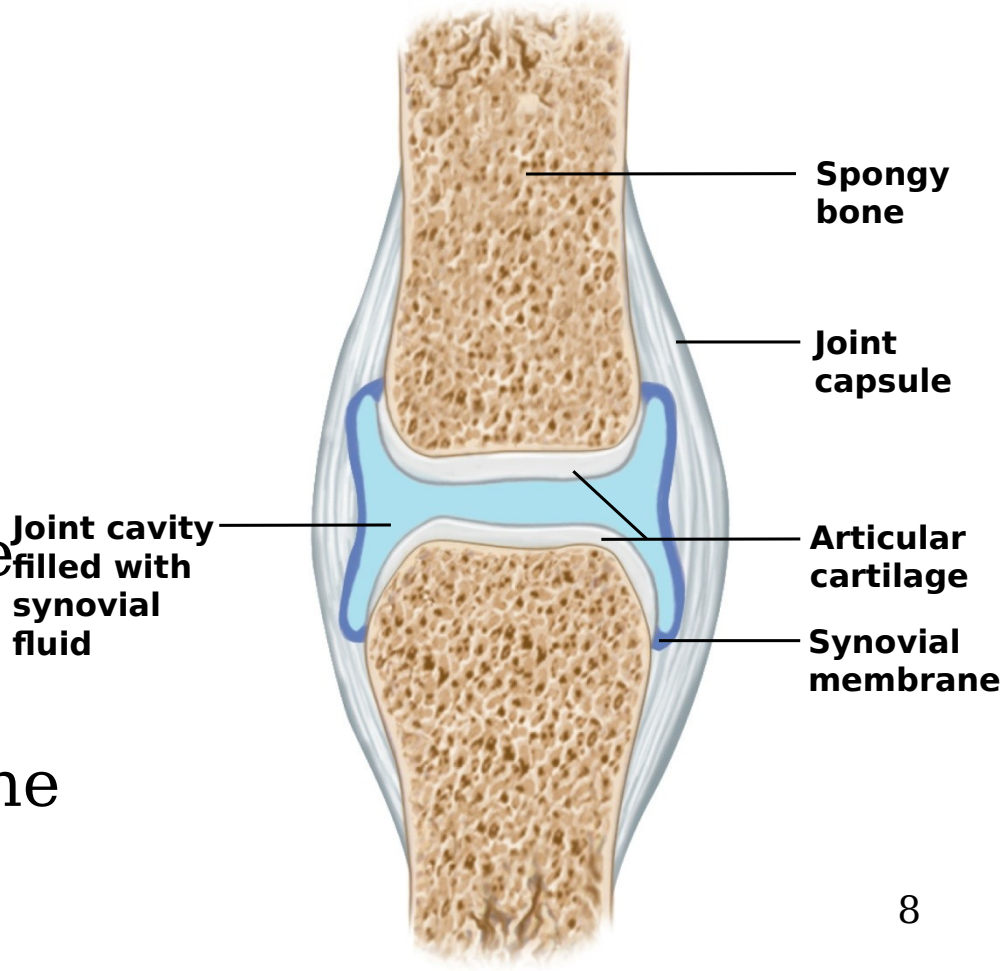

Knee Joint

- Largest joint
- Most complex
- Medial and lateral condyles of distal end of femur and
- Medial and lateral condyles of proximal end of tibia and
- Femur articulates anteriorly with patella
- Strengthened by many ligaments and tendons
- Menisci separate femur and tibia
- Bursae

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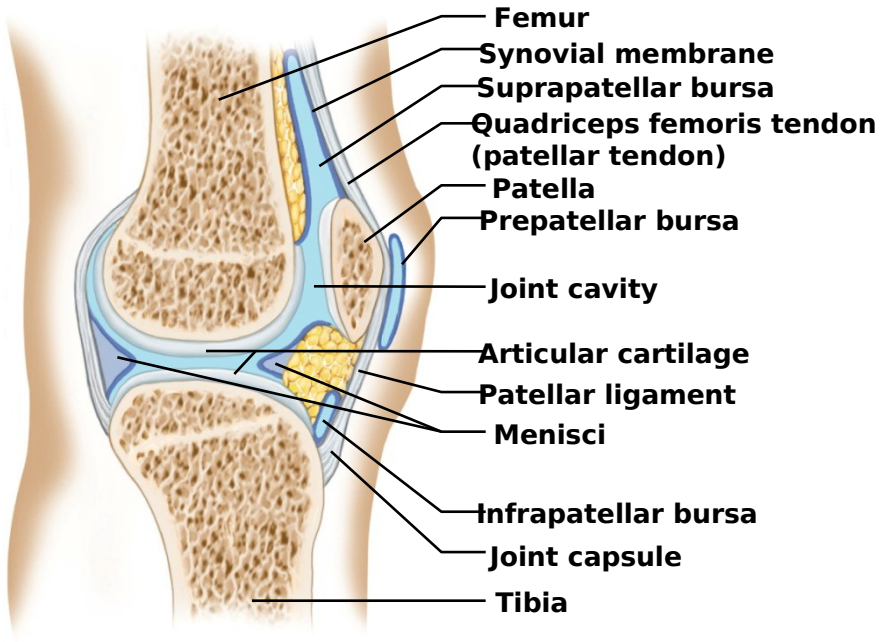

(a)

Types of Synovial Joints

- Pivot Joint
  - Between atlas (C1) and the dens of axis (C2)
- Hinge Joint
  - Elbow joint
  - Between phalanges

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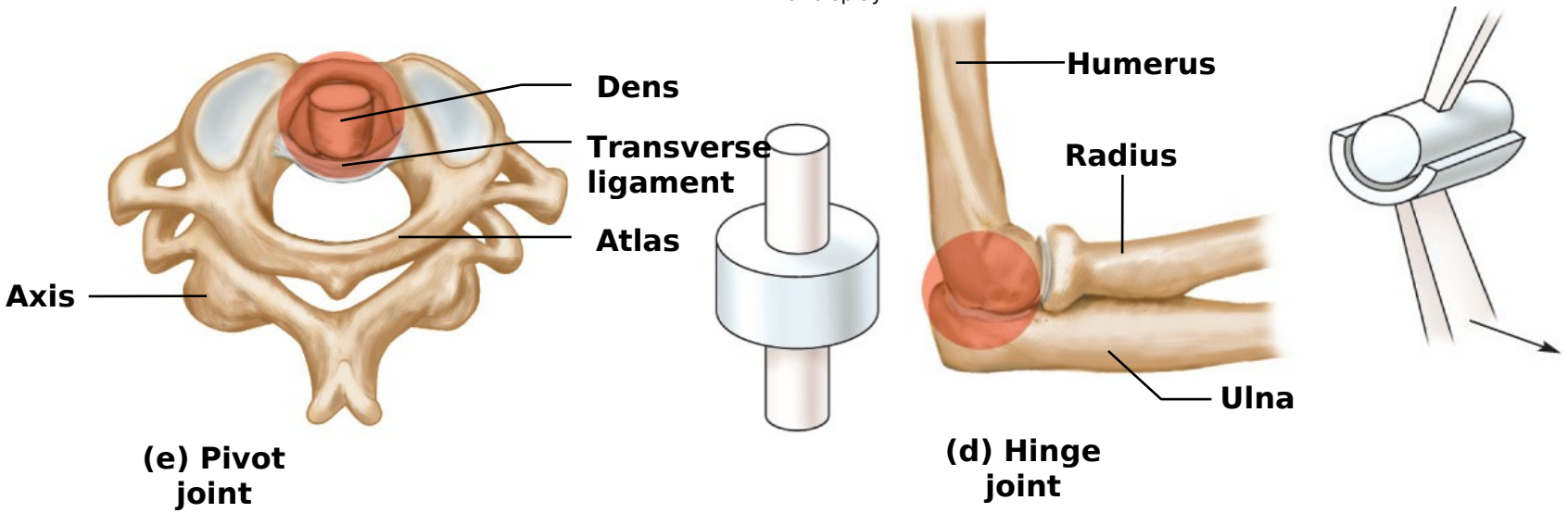

Types of Synovial Joints

- Saddle Joint
  - Between carpal and 1st metacarpal (of thumb)
- Condylar Joint
  - Between metacarpals and phalanges
  - Between radius and carpals

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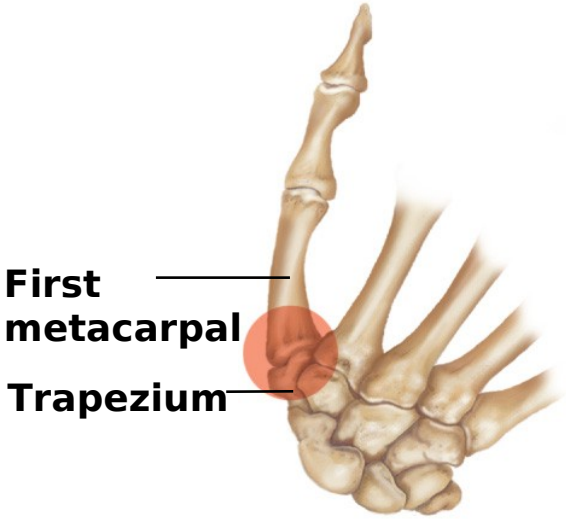
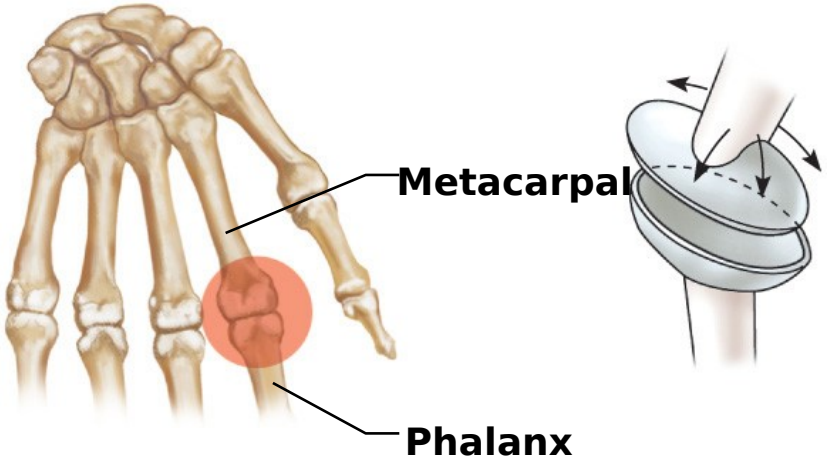


(f) Saddle joint



(b) Condylar joint

Types of Synovial Joints

- Ball-and-Socket Joint
  - Hip joint
  - Shoulder joint
- Gliding Joint
  - Between carpals
  - Between tarsals
  - Between facets of adjacent vertebrae

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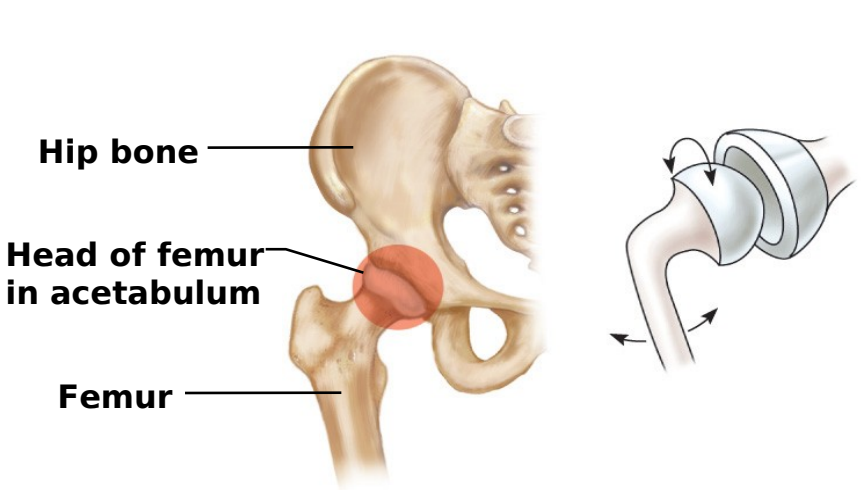
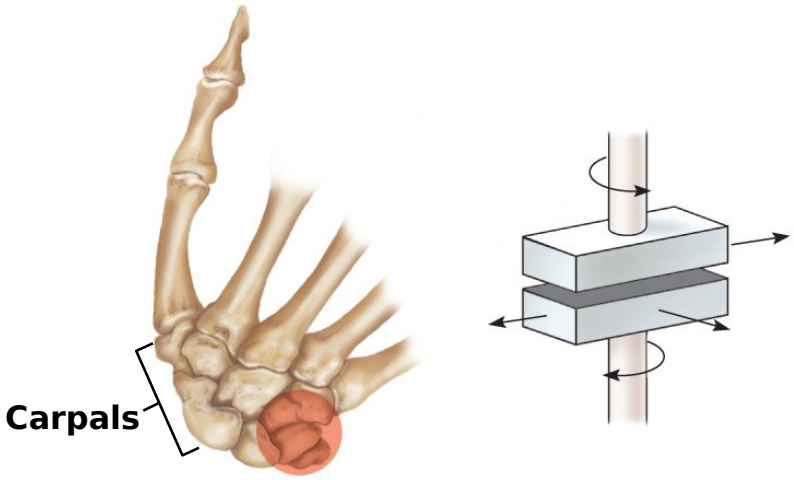


(a) Ball-and-socket joint



(c) Plane joint

8.5: Types of Joint Movements

- Movement at a joint occurs when a muscle contracts and its fibers pull its moveable end (insertion) towards its fixed end (origin).

Types of Joint Movements

- Abduction/adduction
- Dorsiflexion/plantar flexion
- Flexion/extension/hyperextension
- Lateral flexion

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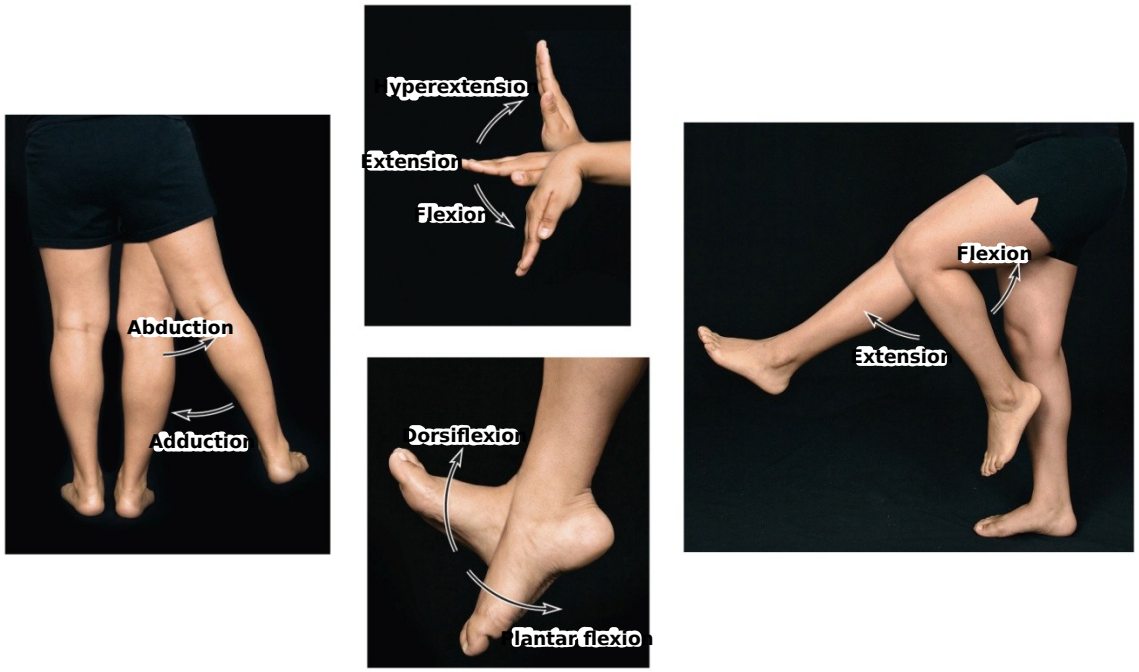

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Types of Joint Movements

- Rotation
- Circumduction
- Supination/pronation

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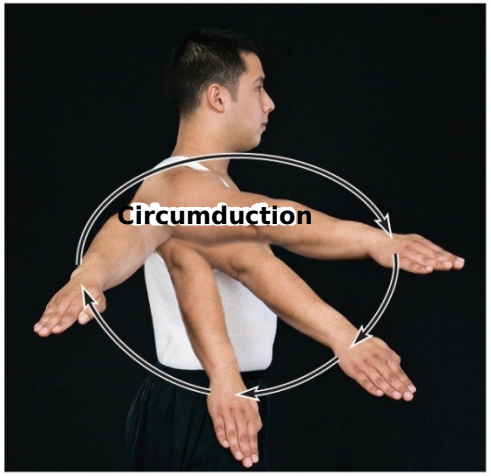

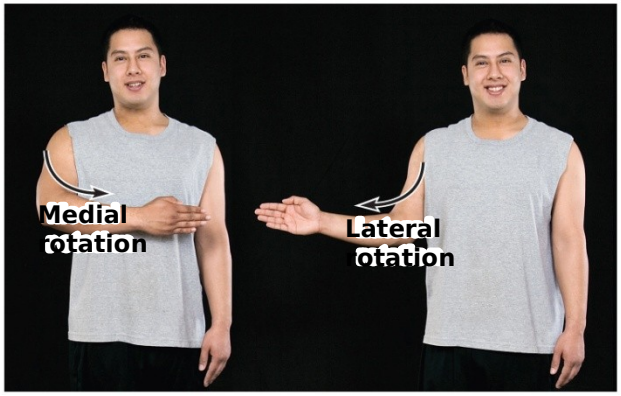

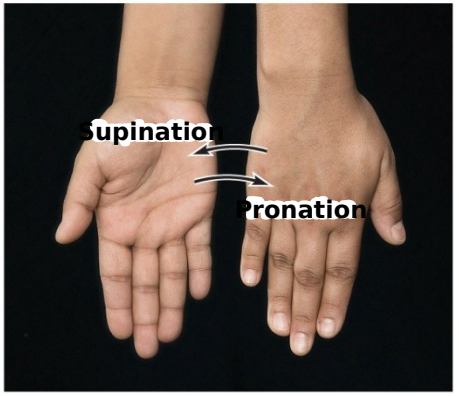

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8.7: Lifespan Changes

- Joint stiffness is an early sign of aging
- Fibrous joints first to change; can strengthen however over a lifetime
- Changes in symphysis joints of vertebral column diminish flexibility and decrease height (remember water loss from the IVDs)
- Synovial joints lose elasticity
- Disuse hampers the blood supply
- Activity and exercise can keep joints functional longer